

;login:

THE UNIX NEWSLETTER

Volume 5 Number 8

October 1980

CONTENTS

Announcements.....	1
San Francisco Usenix Meeting Call for Papers.....	1
Guidelines for Submission of Newsletter Material.....	2
Letters.....	3
DECUS UNIX SIG Progress Report 2.....	7
UNIX Tidbits.....	9
New Commercial UNIX Users Group.....	9
Machine Othello Tournament.....	9
Buffer Deadlock in UNIX.....	10
UNIX in the News.....	11
Wollongong EDITION VII and EDITION VII WORKBENCH.....	11
Microsoft Xenix Operating System.....	12
3COM Corporation - UNET Communication Software.....	14
C in the News.....	18
The C Machine.....	18

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Announcements

San Francisco Usenix Meeting Call for Papers

The San Francisco Usenix Meeting will be held on January 21 through January 23, 1980 at the Jack Tar Hotel in San Francisco. Tom Ferrin of the University of California at San Francisco is the conference chairman. Mike O'Dell of Lawrence Berkeley Laboratory is coordinating the program. Session topics for the technical programs include:

- Networking
- VAX/UNIX
- 7th Edition UNIX
- Applications Software
- Text Processing on UNIX
- What's new with UNIX

Abstracts of all presentations are required and should be forwarded to the following address:

Mr. Mike O'Dell
Lawrence Berkeley Laboratory
Computer Science and Applied Math, SOB/3209
Berkeley, California 94720

A vendor exposition is planned for Wednesday evening. A reception will be held Thursday evening.

A meeting announcement will be mailed shortly.

Guidelines for Submission of Newsletter Material

I would like to use the modern text preparation and communications facilities of UNIX to as great an extent as feasible in the preparation of the Newsletter. I have established an account on our PWB/UNIX system so that those who can provide us with machine manageable material can do so. The telephone number is (512) 474-5511. The login name is login and the password is usenix. (The system is also host utexas on the ARPANET.)

For those submitting paper copy of material, please produce your copy on a daisy wheel printer or similar high quality printing device. Line printer produced copy is typically not adequate for reproduction. Copy should be on 8 1/2" by 11" paper with a 1" margin on left, right, and bottom and 1 1/2" margin on top.

U. S. Mail submissions should be addressed to:

Login Newsletter
Computation Center
The University of Texas
Austin, Tx 78712

Attn: Wally Wedel

Editor's Comment

The login Editorial Board has asked me to note that the material appearing in the UNIX in the News section was edited from material provided by the vendors. Policies for a New Products announcement section are being developed which would contain unedited vendor submissions.

LettersEmployment recruiting at Usenix meetings

There has been a growing concern about the role which commercial institutions should play in USENIX activities. In particular, whether they should be allowed to recruit employees at conferences, and whether they should be allowed to advertise employment opportunities in the USENIX newsletter ";login". I have some opinions concerning these questions which I would like to share.

The major reasons, which I have heard, for denying commercial advertising are:

- USENIX conferences are intended solely for the purpose of information exchange. That is, these conferences are intended to be technical in nature (at least for the most part). Allowing "headhunters" to operate at such conferences would be inappropriate, as many of the attendees are supported by institutions which are unable to compete financially with offers they are sure to encounter. In effect institutions would be funding a job hunting trip by sending a person to a USENIX conference.
- The USENIX newsletter, ";login", is supposed to be an information exchange medium, not a commercial publication. Thus, the information content of ;login should be limited to technical concerns.

Opinions such as those paraphrased above seem, to me, to indicate a fairly narrow outlook on the future of UNIX and USENIX. UNIX is obviously growing in popularity among the commercial institutions and along with this expansion comes the need for people who have experience with the operating system. As a result, businesses, as well as educational institutions, are looking for qualified "UNIX people". It is fairly logical that the first place they would look would be a UNIX conference. In searching for employees, these companies must necessarily advertise their existence and solicit responses from those interested. Albeit this solicitation can go to an extreme I have not encountered anything offensive. In particular, I just recently graduated from school and started work. In my search for work I had decided that one of the prerequisites of my employer would be a use of UNIX, either in its products or in internal use. In short, I didn't want to leave the UNIX community once I left school. It was mainly for this reason that I attended the last USENIX conference in Delaware. I very surprised to find, upon arriving at the conference with a number of resumes, that a ban had been placed on employment solicitations. While this did not deter me from contacting those companies which I had intended to talk to, I firmly believe that I was severely hampered in my search for a suitable job by this ban. My search for a job turned into simply contacting those companies which I was familiar with. If other companies had been allowed to post employment opportunities which I might have found

interesting it is possible I might have found an opportunity more suitable than those offered me (in fact the job I eventually chose was with a company which didn't even attend the USENIX conference). I must believe that there were other students, in a similar position to me, which were hindered in their employment search by the ban on job advertising. For this reason I would like to see businesses allowed to advertise job opportunities both at USENIX conferences and in ;login. While there will inevitably be a few headhunters who will flock to USENIX conferences explicitly for the purpose of "hiring off" a few UNIX wizards, the complete denial of employment advertising appears to be more detrimental than beneficial.

In addition to the above statement as to why I believe commercial advertising should be allowed at USENIX conferences and in ;login there are a few other reasons I believe are worth mentioning.

- Aside from straight employment opportunities, commercial advertisement is useful in identifying those business which employ UNIX in their products, or internally. Acceptance of UNIX in the commercial community is heavily dependent on the marketability of UNIX-based products and UNIX related services. Allowing businesses to be more clearly visible in the USENIX community may induce more companies to join in the use of UNIX.
- Advertising in ;login will surely bring in revenue to USENIX. As this organization appears to be financially strapped at present, any new revenue should be welcome.
- If businesses aren't allowed to participate fully in USENIX, they will surely form a separate USENIX-like group which will allow advertisement and the like. The number of UNIX users is small enough at present that we should stick together, rather than splintering.

In closing then, I favor a less restrictive environment for commercial institutions in USENIX. I believe people should be more tolerant of the growing pains USENIX is experiencing; with greater business involvement in USENIX the organization will be more useful to everyone.

Sincerely yours,

Sam Leffler
(whose opinions do not necessarily represent those of)
Sytek Inc.
1153 Bordeaux Dr.
Sunnyvale, Ca. 94086
(408) 734-9000

A response to the Usenix board notes in the last login.

As a student and then an employee of some companies with very low or non-existent travel budgets, I must speak up in favor of the semi-annual meetings. Since it seems that every other meeting is on the far coast it is possible for me to make only the ones on the east side of the country (i.e. Toronto, Delaware,...) and I'm sure that there are similar problems for those on the west coast. Having two meetings a year helps assure that I can get to at least one meeting a year.

Ronald Natalie
(whose opinions do not necessarily represent those of)
Department of Electrical Engineering
Johns Hopkins University
Baltimore, Maryland

October 10, 1980

Login Newsletter
Computation Center
The University of Texas
Austin, Texas 78712

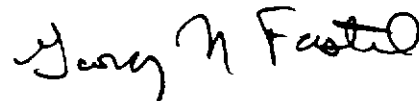
Attention: WALLY WEDEL

In the seemingly self-contradictory hope of laying an issue to rest, I have two proposals for resolving issues of job hunting, vendor advertisements, and other related matters.

1. Democracy. Decisions by all voting members of the USENIX Ass. Elections might be held by mail, or perhaps by "polling" at a publicly accessible phone line to a UNIX.
2. Rote. Examine several "mature" organizations and do what they do. Decision would be autocratic, imposed by the BOD, with suitable documentation of the other organizations.

This newsletter once contained substantive, technical materials -- I would like to see that be the future as well as the past. Let's not pollute it with endless debate over emotional issues.

Sincerely,

A handwritten signature in dark ink, appearing to read "Gary N Foster". The signature is fluid and cursive, with the first name "Gary" and last name "Foster" clearly legible.

Gary Foster

DECUS UNIX SIG Progress Report 2

We are now an official DECUS special interest group. As the September 2 letter indicated might be the case, the name "UNIX SIG" was not approved. We are, at least for the time being, the "Special Software and Operating Systems SIG" -- a bit unwieldy, perhaps, but the best we could do on short notice. Of the names that appeared on last month's "Name that SIG" questionnaire, this was the only one (other than "UNIX SIG", of course) which people seemed happy with. It had a number of negative votes, though, so we can always look into the possibility of a name change at some future time. There were quite a number of other names suggested, but since there wasn't a chance for everyone to express an opinion on them (it would have required yet another questionnaire, and there didn't seem to be time for that), "S.S. & O.S. SIG" is what we are for now.

A few persons pointed out that perhaps this name is even preferable to "UNIX SIG", since it will permit a bit more flexibility in the SIG's future scope, and allow the SIG to evolve as its members' interests expand and change.

In any case, regardless of our name, the description of what our SIG is will definitely make it clear that it's a group of UNIX people, so that other like-minded folks will know what we are.

Now that we're really a SIG, we'll need volunteers for such jobs as librarian, newsletter editor, and symposia coordinator. There've been a few tentative offers, but no firm commitments as yet, so now's the time to step forward!

To receive the newsletter you'll need to join the SIG, and to join the SIG you need to be a DECUS member, so be sure to join DECUS if you haven't already. Presumably those of you who are on this mailing list and who are DECUS members will automatically become members of the S.S. & O.S. SIG, but I haven't had a chance as yet to confirm this. Speaking of the newsletter, by the way, suggestions for a catchy name are welcome.

Mark Bartelt
Caltech 356-48
Pasadena, California 91125
(213) 795-6811, ext 2663

More on the Special Software and Operating Systems SIG*

The DECUS U.S. chapter's executive board recently approved the formation of a special interest group dealing with UNIX and related topics. They did, however, ask us (for reasons other than what you might guess) to call the

* Excerpts from Mark Bartelt's letter of October 28, 1980 to Debbie Scherrer

group something other than "UNIX SIG". Several names were proposed, and the people on our "pre-SIG" mailing list were asked to state their preferences. Based on responses to that questionnaire, the group is now called the "Special Software and Operating Systems SIG". That name was freely plagiarized from the VAX SIG's special software systems working group -- The next time you see Joe Sventek, you might relay my apologies to him for having sort of stolen that group's name.

Here's the way the group will be described in the the next printing of the DECUS U.S. chapter's memberhips form:

The Special Software and Operating Systems SIG provides an opportunity for communication among users of PDP-11 and VAX implementations of the UNIX* timesharing system, for the purpose of exchanging software, helpful hints, experiences (both good and bad!), and whatever other sorts of information users might find useful. The group also has an interest in implementations of UNIX-inspired software on various Digital operating systems. The SIG hopes to begin publishing a newsletter by early 1981.

In this context, of course, "UNIX-inspired software" means, more or less, the sorts of things that the Software Tools group has been involved with.

As for the name, "UNIX SIG" was the group's first choice, but to keep the board happy, we chose "S.S. & O.S. SIG", which most people seemed to find acceptable. A sizeable number of people actually preferred that name, since the scope of the group is wider than just UNIX, and adopting this as our name will permit the SIG to be flexible in its scope, and allow it to evolve and change along with its members' interests.

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UNIX TidbitsNew Commercial UNIX Users Group

Dennis Allison of Stanford, California is organizing a commercial UNIX users group. The group is called /usr/group. The address of the group is

Post Office Box 8570
Stanford, California 94305.

A meeting of the group was held on 17 October 1980 in Palo Alto.

Machine Othello Tournament

The Board of Information Sciences and the Program in Experimental Psychology announce a two-day Othello tournament:

244 Applied Sciences Building
University of California at Santa Cruz
January 17 & 18, 1981

The tournament is open to all individuals or teams who register by January 10, 1981. All expenses associated with transportation, lodging, meals, and equipment or telephone rental will be covered by the individual participants. Entries by individuals or teams operating microcomputer systems located at the tournament site are especially welcome. To register send your name(s), program designation, and equipment description to:

Professor Peter W. Frey
421 Kerr Hall
University of California
Santa Cruz, California 95064

(408) 429-4005

The tournament will consist of eight rounds split equally between Saturday and Sunday. Pairings will be made by lottery on the first round and then by pairing contestants with identical or similar won-loss records in subsequent rounds. Each contestant will be allotted a total of 30 minutes per game including the time required to make moves and flip pieces. The tournament director will adjudicate problems arising from equipment failure on an individual basis. The general guideline will be a maximum of 30 minutes of down time for each contestant for the entire tournament.

Buffer Deadlock in UNIXBuffer Deadlock in UNIX

Darwyn Peachey

Hospital Systems Study Group
3337 8th Street East
Saskatoon, Canada
S7L 4J1

As one of the few installations running 7th Edition UNIX on a "small" PDP-11, we have the dubious honor of having one of the lowest numbers of available disk buffers in UNIX history. With a typical number of file systems mounted, we have only 5 or 6 buffers available for I/O. UNIX functions fairly well even under these conditions, and we can support several people doing program development and text editing. However, because of the scarcity of disk buffers in our system, we have been the victims of an interesting deadlock situation.

The reason for the deadlock is a bug or near-bug in "bio.c" in both 6th Edition and 7th Edition UNIX. When a process enters "breada", one buffer is obtained and used to start the necessary I/O operation. Then a second buffer is requested to do a readahead I/O. With few buffers in the system, the process often must go to sleep until a free buffer is available. Unfortunately, the buffer used for the first I/O will never be made available for the second I/O, because the process is sleeping on the address of the free list header, and the disk driver does a wakeup on the buffer address (NOT the free list address) when the first I/O is completed. The buffer is marked BUSY and is not available for use by anyone until the process which grabbed it gets another buffer and gets out of "breada". In a system with very few buffers and several users it is quite possible for 5 or 6 processes to all enter "breada" and grab buffers at roughly the same time, and then go to sleep waiting for more buffers that will never be available. Every active process in the system very quickly reaches a point where a buffer is needed, and goes to sleep. Nothing can be done except to reboot the system.

I know of other places in UNIX where buffer deadlocks can occur (for example, in "bmap" (file "subr.c") when adding to a large file) but the bug in "breada" seems to be the only one with a high probability of happening. Luckily, this deadlock is easily prevented. My fix consists of changing the "getblk" routine in "bio.c" so that it has another parameter, a flag which is nonzero only in the second "getblk" call in "breada". When the flag is zero, "getblk" behaves exactly as it always has. When the flag is nonzero, no waiting is allowed in "getblk" -- if no buffer is available, a NULL pointer is returned. This allows "breada" to skip the readahead I/O if all buffers are busy. Measurements on our system show that over 99% of the readaheads still get done -- readaheads are only omitted when things are very bad in the buffer pool, so bad that the readahead I/O would probably be of no benefit anyway.

UNIX in the NewsWollongong EDITION VII and EDITION VII WORKBENCH

Palo Alto, CA. Sept.24, 1980. The Wollongong Group announces that its UNIX* products -- EDITION VII and EDITION VII WORKBENCH -- are now available to users of the Perkin-Elmer family of 32-bit super-minicomputers. Available exclusively from the Wollongong Group, EDITION VII WORKBENCH combines the latest UNIX operating system, version 7, with the Source Code Control System developed at Bell Labs.

Source Code Control System (SCCS) is a powerful new facility for computer program development and control. It has not been available on the version 7 UNIX until EDITION VII WORKBENCH, even though it has demonstrated its value to the computing industry on an earlier version.

As specialists in UNIX-based operating systems, The Wollongong Group offers full installation, training, and continuing support to its UNIX customers.

Background to EDITION VII

The Wollongong Group purchased the EDITION VII UNIX-based operating system from the University of Wollongong, Australia. The University had chosen UNIX operating systems for ease of use, excellent program development tools, and documentation capabilities; they had also selected the Perkin-Elmer computer for its power and availability -- and then developed the interface between the operating system and the hardware. Immediately popular with universities, these operating system are now installed worldwide at 20 universities and commercial sites.

Pricing and availability

The EDITION VII and EDITION VII WORKBENCH products are available now for Perkin-Elmer 32-bit super-minicomputers, including the models 732, 832, 3220 and 3240.

A UNIX-based EDITION VII single-user operating system can be purchased for \$12,000. Additional users may be added on a per-port basis. Price includes a binary license, system generation, documentation, installation, one week of on-site training, and 90 days of software support services. An additional one year support contract is available from The Wollongong Group for \$450.00 per month.

Microsoft Xenix Operating System

The XENIX® Operating System from Microsoft is a microprocessor adaptation of Bell Laboratories' Version 7 UNIX® operating system. With the XENIX operating system, Microsoft is bringing the power of the UNIX OS to microcomputers. The XENIX Operating System will be released in versions that run on the Zilog Z8000, Motorola M68000, Intel 8086, and the DEC PDP-11®.

A Standard for the Eighties

The XENIX system is an interactive, multi-user, multi-tasking operating system with a flexible user interface. It's capabilities are so varied, it can be used effectively in all applications, including: distributed dp, information management systems, networking, process control, science, engineering, and simulation.

Microsoft is committed to supporting the XENIX system as an environment for program development that will be identical on all the popular 16-bit microprocessors. Different CUs, as well as different hardware boards for the same CU, will be supported. The XENIX system's inherent flexibility, along with this commitment from Microsoft, will make the XENIX OS the standard operating system for the computers of the eighties.

XENIX Operating Systems Features

- ** Device-independent I/O
- ** Tree-structured file directory and task hierarchies
- ** User-space command language allows:
 - * Foreground and background program execution
 - * Easy redirection and chaining of program input and output
 - * Batch control files
- ** Inter-process communication features: pipes and signals
- ** Facilities for distributed DP and network applications.

Added Software Features

In addition to the operating system itself, the XENIX system includes all of the support software from Bell Laboratories that was added to the UNIX system during the last decade. This large volume of software is vital to the total working environment created by the XENIX operating system. It

* PDP-11 is a trademark of Digital Equipment Corporation
UNIX is a trademark of Bell Laboratories
UNET is a trademark of 3COM Corporation
XENIX is a trademark of Microsoft

includes:

- ** C language compiler
- ** Text editing and typesetting software
- ** Subroutine libraries
- ** Assembler and debugger.
- ** System software development tools

XENIX Support Features

The XENIX OS is backed by Microsoft's experience and expertise in producing quality system software. Our support services and support software are what guarantees a long-term viability for the XENIX system.

- ** OEM customization and modifications are provided by Microsoft.
- ** One year maintenance and bug fixing is included with the OEM license.
- ** System software from Microsoft (including COBOL, Pascal, BASIC, DBMS) will be compatible with the XENIX OS.
- ** Microsoft will provide a clearing house for software developed by UNIX and XENIX users, including sophisticated software like the UNET® communication package from 3COM Corporation, Menlo Park, California.
- ** Microsoft will support a full line of C compilers and cross-compilers.

Serious Software Development

Microsoft is committed to having a version of the XENIX system for every popular 16-bit microprocessor by the end of 1981. A standard, portable operating system with the scope and power of the XENIX system will create a focal point for all 16-bit software efforts. Users will be able to move from system to system with the same software and the same skills. Users will not be locked into one particular microprocessor or instruction set. The XENIX system's C compilers and other high level languages from Microsoft such as Pascal will give users a set of interchangeable tools for shared software development. Thus, serious software development can be protected against becoming hardware-obsolete, and software efforts can be shared instead of duplicated.

Microsoft is licensing the XENIX system under a distribution license from Bell Laboratories. The PDP-11 version will be available in October, 1980. XENIX-8000 for the Z8000 microprocessor is scheduled for general release at the end of 1980. Versions for the M68000 and 8086 are scheduled for the first half of 1981.

For more information, contact Bob Greenberg, XENIX Product Manager
Microsoft 10800 NE 8th, Suite 819, Bellevue, WA 98004 (206)-455-8080.

3COM Corporation - UNET Communication Software

Menlo Park, California ... 3Com Corporation today announced its UNET communication software for UNIX. 3Com Corporation's UNET software provides communication among computers running the UNIX operating system. UNET transfers files, connects remote terminals, and carries electronic mail. UNET implements recently standardized packet internet protocols and related services developed by the U.S. Defense Advanced Research Projects Agency after more than a decade of research on packet switching and computer network architecture.

UNET software is installed on customer hardware along with UNIX operating system software developed at Bell Laboratories and licensed by Western Electric. UNET software drives communication hardware to provide file, terminal, and mail communication services.

Microsoft and 3Com to Cooperate on 16-bit Strategy

3Com offers its UNET communication software in cooperation with Microsoft, Bellevue, Washington. Microsoft set industry standards for 8-bit microprocessors with its Basic, Cobol, Fortran, and Pascal. Microsoft's new XENIX operating system, based on the UNIX operating system under license from Western Electric, will lead the company's software strategy for the new 16-bit microprocessors. 3Com is offering UNET for XENIX and is working with Microsoft to establish standards for 16-bit software and communication compatibility.

UNET FTP Transfers Files

From a terminal connected to a local UNIX a user can direct the UNET File Transfer Program (FTP) to connect with another UNET FTP running on a remote UNIX. After submitting a password a user can manage files on the remote UNIX file system. UNET can list the names of a user's remotely stored files. Files can be transferred between a local and a remote UNIX. And, to aid in conserving and organizing remote file space, the user can direct the UNET FTP to rename or delete remotely stored files.

UNET VTP Connects Remote Terminals

From a terminal connected to a local UNIX a user can direct the UNET Virtual Terminal Program (VTP) to connect with another UNET VTP running on a remote UNIX. After submitting a password the user can then operate the remote UNIX as if the local terminal were directly connected to the remote UNIX. The UNET VTP allows a user to initiate and control the operation of UNIX programs running on a remote UNIX with remotely stored files.

UNET MTP Carries Electronic Mail

From a terminal connected to a local UNIX a user can direct the UNET Mail Transfer Program (MTP) to take a message typed by the user at a local terminal and distribute it into the electronic mailboxes of a list of users on the local UNIX or, using the UNET FTP, users whose mailboxes are on remote UNIX file systems.

UNET Offers Computer Communication Compatibility

UNET offers file, terminal, and mail communication services to UNIX users, either for their direct use from UNIX terminals or for use from computer programs that they write to run on UNIX. By writing programs that call UNET facilities, use of UNET can be extended to handle the communication needs of those who are not programmers and not even experienced UNIX users.

UNET provides more than UNIX file, terminal, and mail communication services -- it provides compatibility. UNET implements these services for UNIX using standard, vendor-independent packet internet protocols. Use of UNET on UNIX enables, therefore, compatible communication with non-UNET, non-UNIX computer systems. Further, such compatible communication can be accomplished through a variety of communication media interconnected in potentially large multimedia internets. And, because the standard protocols implemented by UNET are layered, UNET can be compatibly extended by 3Com or others to provide additional communication services as the need arises.

3Com Corporation's UNET software product inaugurates a compatibility-based computer communication business strategy. UNET is an implementation for UNIX of the new U.S. Department of Defense (DOD) Standard Internet Protocol (IP) and Transmission Control Protocol (TCP). 3Com sees broad applicability and wide acceptance of the DOD Standard IP/TCP in commercial markets. 3Com IP/TCP implementations for other computer operating systems will follow growing demand.

UNET, like UNIX, is written in the portable high-level programming language C. 3Com plans to license UNET to end users running UNIX on PDP-11s, but most UNET users will be reached through business system manufacturers using the new 16-bit microprocessors including the Intel 8086, Zilog Z8000, and the Motorola 68000.

The first customer release of UNET, called UNET 1.0, will be ready for delivery with documentation in the fourth quarter of 1980. 3Com is now completing its first internal UNET release while planning deliveries with customers showing early interest.

3Com's UNET team includes Bruce Borden, Howard Charney, Bob Metcalfe, and Greg Shaw. Bob Metcalfe has been working on packet communication since 1969 when he began work on Arpanet at MIT; in 1972 he went to Xerox where he invented Ethernet, was a member of the team that began work in 1973 on what was to become the DOD Standard IP/TCP, and developed Xerox's IP/TCP-like internet packet protocol architecture, Pup. Bruce Borden has been working with UNIX since it first appeared outside of Bell Laboratories at Harvard in 1974; he recently came to 3Com from the Rand Corporation where he connected UNIX systems to the Arpanet.

UNET Licensing Meets Customer Needs

3Com UNET communication software is licensed following the approach adopted by Western Electric for UNIX licenses. Right-to-use source licenses are offered to end users and right-to-distribute binary licenses are offered to OEMs. In addition, 3Com offers installation and maintenance support.

UNET source license, first CPU\$7,300

UNET source license, each additional CPU\$4,300

Please contact Bob Metcalfe at 3Com Corporation, (415) 854-3833, for information on licenses, installation, and maintenance.

Prices subject to change without notice.

UNET and 3Com are trademarks of 3Com Corporation.

UNIX is a trademark of Bell Laboratories.

XENIX is a trademark of Microsoft.

C in the NewsThe C Machine from BBN

Date: 19 Nov 1980 10:08:12 EST
From: Carl D. Howe <cdh at BBN-C70>
Subject: a C machine
To: INFO-MICRO at MIT-AI

The following does not squarely fit in microland, but I thought that it was of enough general interest to send anyway.

This message is being sent from a new computer, the BBN C machine, temporarily on the net as host 2/63. The C/70 (the more formal designation for the C machine) is a product of BBN Computer Company (a subsidiary of the BBN that built the ARPANET) and has a microcoded instruction set specifically aimed at the C language. The machine runs Version 7 UNIX with a full NCP network implementation included. The machine address space is 1 megaword (the process address space is 1 Megabyte), and in general uses 20 bit words. The emulated macromachine has addressing modes for most of the C data types including structure elements, array elements, local variables, and combinations of all of the above. Also included in the architecture is the ability to call microcode in exactly the same way as calling macrocode, thereby allowing users to create macrocode "stubs" for microcode functions. All the C machine microcode including device drivers is contained in about 6K of RAM, leaving 2K available for future expansion.

Peripherals already in production include SMD hard disks (we currently use dual 80 or 160 MByte disks), a 32 line asynchronous terminal multiplexor, and an ARPANET compatible interface port (obviously). The central processor has been in production for several months. The entire C/70 consists of 4 main boards (this includes the disk controller, terminal multiplexor, and network interface).

Performance running UNIX is comparable to that of a PDP-11/70 also running UNIX. Memory speed is 540 ns and is not cached (the memory is fast enough as it is); however, there are 1024 135-ns access registers which are cached in sets of 8 as general purpose registers. Therefore, function, subroutine, and system calls simply select another set of 8 registers rather than saving and restoring registers to memory. In the case of the register cache becoming full, registers are dumped to memory using a fast microcode loop. This optimization produces a function call that runs in 1/3 the time of the PDP-11/70. The Kashtan VAX benchmarks have been run on both the C/70 and the PDP-11/70 and their run times are quite similar (even though they are small enough for the 11/70 to run entirely out of its cache).

Some enhancements to the Version 7 UNIX software exist either in the basic system or as extra cost items. These include a screen-oriented text editor configurable for arbitrary terminals and systems, an electronic mail system (obviously), and support for psuedo-ttys.

A picture and general description can be found starting on page 46 of the November 6 issue of Electronics. There also exists an advertisement in the November issue of Datamation if anyone is interested.

If anyone has questions of a technical nature, reply to cdh@BBN-UNIX (you can try 2/63 (the C machine), but I just have it forward my mail to BBN-UNIX anyway). Also, don't update any host-number tables to include BBN-C70 as this is a shared net connection with other hosts, many of whom will not appreciate random traffic being sent at them.

Carl Howe cdh@BBN-UNIX

The Usenix Association

PURPOSE: The Usenix Association is an organization of Western Electric licensees and sub-licensees formed for the purpose of exchanging information and ideas about the UNIX operating system and the C Programming Language.

MEMBERSHIP: Four classes of membership in Usenix are offered:

1. Institutional Membership. Institutional Members are the voting members of the Usenix Association. This class of membership is open only to licensees or sub-licensees of Western Electric Co.
2. Non-voting Institutional Membership. This class of membership is open to corporate affiliates of AT&T.
3. Individual Membership. Open to employees of class 1 and 2 members and others who are bound by the software agreements with Western Electric and its licensees.
4. Public Membership. Open to anyone with a bona fide interest in the purpose of the Usenix Association.

For further information write:

Usenix Association
Rockefeller University
Box 8
1230 York Avenue
New York, New York 10021
(212) 360-1182

Facts about UNIX and the Programming Language C

The UNIX operating system was developed by Ken Thompson and Dennis Ritchie of Bell Laboratories in Murray Hill, N.H., during the early 1970's. The C Programming Language was developed originally by Thompson and Ritchie as the implementation language for UNIX. UNIX is made available to the public by Western Electric Co. through its patent licensing office in Greensboro, North Carolina.

A fine overview of UNIX and C was published in the Bell System Technical Journal, Vol. 57, No.6; Part 2, in August 1978. The C Programming Language is described in the book The C Programming Language by Brian Kernighan and Dennis Ritchie published in 1978 by Prentice Hall.

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